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Executive Summary

Tailor Approach to Stage of Existing Vision

If the jurisdiction has:

- A less-developed vision → establish a cohesive set of goals early in the process based on community values and objectives.
- An established vision → focus on iterative design through community and stakeholder feedback.

Identify Strong Project Partners

Work with community-based organizations to identify local partners and stakeholders.

Use a Range of Community Engagement Formats and Venues

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Develop Effective Visual Communication Tools for Online and In-person Access

Use Collision Profiles and Community Input to Inform Design Solutions

If the jurisdiction has:

- A less developed vision → use corridor-level metrics to compare alternative cross-sections.
- An established vision → use intersection-level or treatment-specific metrics to compare certain elements of a preferred alternative.

Develop Performance Measures that are Project Stage- and Scale-Appropriate
Introduction

This report compiles lessons learned through the Grand Boulevard Initiative’s Creating Safe and Healthy Corridor Communities Project (the Project) as a resource for other communities on the El Camino Real Corridor. The Project studied existing conditions, collected community input, and prepared design recommendations for two case study segments of El Camino Real, one in Redwood City (San Mateo County) and one in Palo Alto (Santa Clara County).

This Project built upon the overall GBI vision and previous local Corridor Plans while focusing specifically on improving safety for those traveling by bike or on foot and reliability for those using transit. The Palo Alto and Redwood City study segments were selected based on their high proportion of bicycle and pedestrian collisions relative to other portions of El Camino Real and similar roadways statewide. A comprehensive engagement process included strategies to engage the community during everyday activities along the corridor including adjacent “communities of concern,” or low-income areas, as defined by the Metropolitan Transportation Commission (MTC).

Informed by community input, the Project delivered conceptual streetscape designs that can be implemented to bring the Grand Boulevard Initiative Vision to reality and meet safety, mobility, and sustainability goals jointly held by the State, San Mateo and Santa Clara counties, and local communities along El Camino Real. This Project emphasized the application of multimodal transportation design promoting compact, walkable development and a localized mode shift from the automobile to transit, walking, and biking. These emphasis areas impart Grand Boulevard Initiative Guiding Principles on the Project and reflect goals important to both Palo Alto and Redwood City.

The designs were developed in coordination with Caltrans and the final concepts showcase Caltrans’ recent design flexibility and focus on multimodal mobility. This report shares lessons on project set-up, stakeholder engagement, community engagement, design process, and quick-build strategies for near-term, phased implementation. The report also includes a design library showcasing Caltrans-approved approaches to separated bikeway design, pedestrian crossing treatments, and transit reliability strategies.
Lessons Learned & Best Practices

The lessons learned should be considered when scoping any future complete streets project along El Camino Real or similar facility throughout the State. The local context, stakeholder engagement, and resulting recommendations delivered for Palo Alto and Redwood City are unique to the corridor segments studied, but the study process and many of the individual design treatments are transferable to other parts of the corridor and similar corridors.

Scope, Schedule, and Budget

Tailor Approach and Deliverables to the Stage of Existing Vision: El Camino Real is a well-studied corridor shared by numerous jurisdictions, transit agencies, and community organizations. As such, any new study should tailor its scope, schedule, and budget to the current stage of visioning and planning around the segment in question. Having just completed the El Camino Real Corridor Plan in December 2017, Redwood City joined the Project with a solidified conceptual vision for their corridor. For communities with a similar level of previous work, the focus should be to advance the established vision through iterative design. Community outreach should focus on refining details such as cross-section dimensions, priority locations for enhanced crosswalks, bus stop design, and layouts for roadway realignments. The goal is to develop a set of design concepts using input from community and project stakeholders that help to visualize the layout of proposed curbs, striping, and intersection safety treatments. Bicycle safety treatments can be assigned to each intersection based on the level of conflicting vehicle volumes, existing traffic control, and level of vehicle access. Palo Alto’s segment was not studied as recently, and the conceptual vision was more uncertain.

Establish a cohesive set of goals based on community values and objectives early in the process: Certain goals, such as safety, may be determined prior to the start of a project if collision rates are known to be high. Goals can also be determined by visualizing corridor needs and trade-offs and prioritizing goals based on community values. Project goals should be set early on and clearly communicated during each stage of community outreach to maintain a cohesive narrative. The process of developing design concepts should focus on high-level alternatives that include clear trade-offs and incorporate established goals. It’s useful to answer key questions that will guide the designs prior to laying out the plan lines for multiple alternatives. For example, should mobility be prioritized over parking storage along the corridor? Are protected intersections feasible or desirable at intersections? At this stage, consider using visualizations such as 3D models, cross-sections, or diagrams that pair needs with solutions to communicate trade-offs, rather than plan view concept lines which can be difficult for the public to fully comprehend.

Plan for multiple rounds of outreach and iterative design process: Schedule and budget should account for an outreach process that gathers input at strategic points in the design process. The design process should be responsive to public and agency feedback. Budget should include meetings with technical advisory committees and business owners to understand community preferences for the design elements. Consider data that may be needed for the design process and/or consensus building such as parking utilization, peak turning volumes at intersections, and economic impacts for parking removal, if applicable.

Consider Implementation Needs: Schedule and deliverables should be aligned with the timeline and materials for appropriate grant applications when possible. Design concepts formatted to be
easily folded into a grant application can help cities – especially those with a solidified corridor vision – move forward with implementation. Additional opportunities for implementation can include identifying a phased approach to coordinate with repaving programs, development projects, or other available construction funding.

Project Partners

Identify Effective Project Partners: Agency partnerships may be useful for future studies to secure and manage grant funding, which was the role SamTrans GBI staff played for this Project, so that cities can focus on project work rather than administrative details. Establishing partners that support and help communicate the vision of the project is also key to developing a wide base for outreach. Future studies should consider partners that are plugged into GBI such as the Task Force, or other initiatives that may have overlapping visions such as the Peninsula Bikeway, to make use of their networks for advertising. A technical advisory committee (or TAC) is useful to guide the overall direction of the project and ensure the proper agencies are kept in the loop with the status of deliverables. This committee should include groups such as local congestion management agencies (CMAs), public health agencies, and Caltrans. Extended members such as fire or police departments, business owner associations, or other stakeholders can be invited to these meetings to discuss deliverables if appropriate. Partnering with community-based organizations such as a YMCA, public health organizations, bicycle coalitions, community centers, or local non-profits can help to create a positive, safe space for community input. Finally, having a City staff project lead that is dedicated to the project is useful to maintain steady communication with the public during outreach and to maintain momentum throughout the project delivery.

Develop a clear plan for consensus building: A City staff project lead with adequate time dedicated to the project is especially important. Given the high-profile nature of changes to the El Camino, community outreach strategies may follow a nonlinear direction, that may require more time and focus for less politically charged projects. A City representative possesses local knowledge and having direct conversations with staff about potential political challenges can help to develop a plan for proactively addressing setbacks. The preferred approach for some cities may be a slower phased approach, focusing first on exploring and identifying the top alternatives, each with varying level of political feasibility. A city council or another governing body can then weigh in on a clear list of next steps to reach community consensus during a future phase of the project. For other communities, reaching consensus on the preferred alternative by the end of the project may be more important. If this is the case, identifying which governing body will make the ultimate decision and gathering input from them to identify criteria for that decision will be important early on. Project performance measures may be a useful tool for developing these decision-making criteria (see Performance Measures section). Getting to a preferred alternative, especially when controversial steps such as removing parking or a travel lane is involved, will require engaging with a broad spectrum of the community. Knowing the community will be important, and maintaining high visibility for the project throughout the process will be key. This may require more cost-intensive strategies to build awareness, such as developing permanent informational kiosks or signage for installation along the corridor, door-to-door outreach to business owners, forming a community advisory group, or meeting with multiple stakeholder groups to build narratives from a broad spectrum of the community. Consider allocating more budget for outreach and less on the technical stages if determined appropriate with city staff.
Community Engagement

Given the wide range of users and geographic centrality of El Camino Real at the heart of many communities, it’s critical for community engagement be a robust element of the project design. This section includes best practices and lessons learned on the timing, format, and communication strategies for community engagement.

Timing

- **Engage Early**: community members should be included as early in the visioning process as possible. Their insights as daily users of the corridor are far more valuable in the visioning and early concept phases than they are in the more detailed design phase where street design expertise and engineering drive the process.

- **Engage Often**: Just because the public’s input is most critical in the visioning and concept phases does not mean you can reach out once and be done with it. We found that multiple rounds of each outreach format were valuable for a couple of reasons:
  
  - Subsequent rounds allow you to summarize what you heard in previous rounds and confirm those takeaways with the public. This strategy demonstrates you listened and successfully incorporated their feedback, or alternatively allows you an opportunity to course correct if feedback was not accurately or fully captured the first time.
  
  - If we ask community members for their help developing the initial concepts, it becomes their project as much as it is the City’s or the consultant’s. This sense of ownership will only increase if you continue to engage the community as the concepts develop and become more “real.” This type of continuous engagement is more likely to leave residents feeling enthusiastic about and supportive of the final product. We found this to be true in Redwood City, where community members were aware of the previous El Camino Real Corridor Plan outreach efforts and felt this Study offered continuity and an extension of ideas they had expressed previously.

Format

- **Use a Range of Engagement Formats and Venues**: The Palo Alto and Redwood City engagement efforts included in-person “pop-ups,” stakeholder focus groups, online surveys, web maps, traditional open houses, and a living preview. Each type of outreach connected the project team to a distinct segment of the local community and gathered new, diverse perspectives on the vision for the corridor.

Outreach Principles

- Meet people where they are
- Keep it interactive
- Communicate effectively
- Engage equitably
Pop-ups meet people “where they are” and require no extra planning or commitment from members of the public to participate in the input process. They intercept many members of the public who otherwise may not have participated in the planning process or are constrained by schedule or transportation options to attend traditional public hearings.

Stakeholder meetings ensure that critical groups of corridor users—such as business associations, school PTAs, and bicycle coalitions—are brought into the planning process from the beginning. They also offer an opportunity to hear concerns and jointly brainstorm solutions with the groups that are most often vocally opposed to changes to “their” corridor. In Palo Alto, parking was one of the more controversial topics discussed during outreach and it was helpful to hear stakeholder views on parking removal and management, particularly business owner views, in a focus group-setting. Differing views among business owners and adequate time for discussion added nuance to the parking management conversation.

Online surveys and web maps reach a much larger swath of the community than in-person outreach is typically capable of doing. Online visuals can be the same as the print materials used for in-person events. This consistency means online engagement has the added benefit of serving as a place for in-person visitors to follow-up and re-visit the exhibits they saw at the pop-up or meeting. We met many people at in-person events who could not stay and chat; we were able to provide them with a coaster-style flyer with a URL link to the online materials.

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Traditional open houses hosted on a weekday evening in a public building do not work for everyone’s schedule or communication needs, but they are still expected by many community members. They are also a unique long-format event that allows for more in-depth conversations and collaborative brainstorming with residents. To maximize attendance at evening open houses, it is best practice to provide food and either activities for kids or childcare so that parents can attend the event without arranging childcare.

Living previews bring a project concept to life in a way no other outreach format can. They should be seen as an iterative design strategy as much as they are an engagement strategy. They allow the project team to test the dimensions and operational expectations for a new streetscape design and help community members view the built environment as more flexible and changeable than is typically assumed.

Keep It Interactive: Outreach materials should present information to the community and require the community to engage with and respond to that information. Large-format posters (or online web maps) should encourage visitors to draw, write, or otherwise record their experiences using the corridor.
• **Engage Equitably:** By planning ahead and employing a few equity strategies, the engagement process can reach a more diverse cross-section of the many communities that line El Camino Real.

  ◦ In-person events, particularly pop-up events, should be hosted at a variety of venues across a sampling of the neighborhoods or districts surrounding the study area, and at different times of the day on both weekdays and weekends.

  ◦ In-person events should provide activities to engage kids and translation services for commonly spoken languages in the study corridor, including consideration of deaf or blind community members. If meetings are held in the evening they should offer substantial food and not just desserts or refreshments. These strategies encourage community members who often feel unable to participate due to childcare responsibilities, unwelcome due to language barriers, or constrained by long work hours and competing priorities to make dinner for themselves or their family.

  ◦ Consider mode of travel accessibility of your meeting venues. To collect feedback from public transit users, bicyclists, pedestrians, and drivers, select venues that are accessible by all modes. Also ensure handicap accessibility when selecting venues. Make sure to promote the options for traveling to the venue on marketing materials.

  ◦ Engage community-based organizations in the development of the engagement plan. Solicit their input on outreach format, content, and key stakeholder recommendations. In Redwood City, one of the pop-up events was hosted at a local community center during a free grocery distribution day. The population reached through this event had a much higher proportion of Spanish speakers, low-income residents, and transit-dependent residents than any of our other events. Other types of community-based organization to consider partnering with include community arts and recreation centers, religious institutions, child care centers and education non-profits, youth organizations, senior centers, Safe Routes to Schools, neighborhood associations, and cultural resource centers.
The first in California was in Ontario (Caltrans District 8) on SR 83, Euclid Avenue.

The Design

On a regular day, this stretch of El Camino Real has four lanes of fast-moving traffic, no dedicated bike lanes, and narrow sidewalks. Taking advantage of an existing red curb, the bus stop location was selected as the popup site. This location was also selected due to the high volume of existing bike/ped activity, centrality on the Corridor, and limited driveway cuts and a wider right-of-way.

The bike lane was installed according to the dimensions of the proposed design for this segment: a 7’ bike lane with a 4’ buffer. Temporary planters were arranged within the 4’ buffer to separate the lane from car traffic. Cones and signage were also used for the duration of the three-hour event to give vehicles advanced warning that the shoulder was closed along this block-long stretch. Although the bus stop was temporarily relocated up the street, this location also proved to be an opportunity to observe transit interface with the bike lane.

When executed early enough in the design process, living previews can serve as an “iterative design” tool, followed by a redesign of the cross-section or striping plans according to what worked in the field. This could be a particularly useful approach when the study corridor involves bicycles interfacing with loading zones, bus stops, or other curb obstacles.

Logistics

The following steps were required to pull the living preview together:

1. Caltrans Encroachment Permit: This will require a completed permit application form, a traffic control plan stamped by a certified engineer, an event route map, and a completed work scheduling request form. Start the permitting process as early as possible to leave room for advertising.

2. City & Business Coordination: Site plans will likely be reviewed by city departments if the popup involves City side streets. Coordinate with business if their site access is impacted.

3. Transit Agency Coordination: If your design involves relocating a bus stop, you will need to coordinate with the transit agency to get approval. Even if you are not relocating a transit stop, it is a good idea to alert the transit agency ahead of time about the planned event.

4. Event Materials: Whenever possible, work with local businesses to borrow or rent planter boxes and plants. If you list these businesses as a partner in your advertising materials, it is likely they will be willing to loan materials for no cost. Typically, the city can provide all signage and cones for traffic control, but make sure to check ahead of time.

5. Advertise Early: Advertise as early as possible, ideally with the goal of sending out flyers and notices at least 2-3 weeks in advance of the event.

Additional Tips

- Living previews should be a team effort by stakeholders who ultimately benefit from the project. Consider splitting up the tasks among agencies that have a stake and a desire to see the event be successful.

- Advertise and coordinate with other events if possible. Consider coordinating a group ride through the bike lane demo, possibly from a nearby event.

- Consider reaching out to community-based organization and businesses on the corridor with personalized emails to invite them to participate.

- Bring extra bikes and scooters to get pedestrians involved.

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1 The first in California was in Ontario (Caltrans District 8) on SR 83, Euclid Avenue.
Messaging

- **Communicate Project Purpose:** A common first question at outreach events is "why are you doing this study?" Have the answer ready and displayed front and center on all outreach materials. The Palo Alto and Redwood City study locations were selected because they have among the highest pedestrian and bicycle collision rates compared to similar roadways statewide. We had this information displayed on a one-pager at outreach events and as the welcome page on our online surveys.

- **Discuss Goals as Trade-offs:** Every transportation project has trade-offs and it’s important to acknowledge these upfront when determining goals for the project. Present relevant trade-offs to the public through online materials and web and in-person surveys as an exercise for prioritizing goals (see the Bus Stop Options cutsheet in the design library as an example of presenting tradeoffs). Efforts should be made early on to address trade-offs in order to set clear guidance for the final design concept. The El Camino Real corridor has a finite amount of space in which to move people, store vehicles, and serve as a space to play, shop, and dine. Two of the most important trade-offs to communicate to the public are:
  
  ◦ **Modal trade-offs:** this means discussing which modes are available for moving along the corridor today, which modes should be available in the future, and what infrastructure changes might be needed to improve access for more modes. These trade-offs could be discussed in qualitative or quantitative terms by using performance measures (see page 9) agreed upon by the advisory committee.
  
  ◦ **Throughput vs. access trade-offs:** The El Camino Real right-of-way has traditionally served to move cars and buses in the travel way, store cars in the parking lane, and move pedestrians on the sidewalks and crosswalks. It is important to discuss whether mobility and access are equally important for the study area in question. Are the gains associated with removing car parking (and replacing it with an additional travel or turn lane, a protected bike lane, a bus only-lane, a curbside loading zone, bicycle parking, parklets, or a wider sidewalk) more valuable than the parking itself? The answer will depend on the community, surrounding land use, and availability of off-site parking.

  It is critical for the community to have all the facts and understand the trade-offs when they help craft the vision for the corridor.

- **Keep Relevant Data On-Deck:** We learned to proactively prepare parking counts and corridor counts for all modes. People will ask for these details and it’s helpful to have them visualized in an easy to understand way when talking with community members at in-person events or as back-up documents for people to explore on-line.

- **Develop Effective and Accessible Visual Communication:** Data is only useful if it is made legible and easily accessible to the general public. This means removing jargon and acronyms, orienting the map or streetscape in an intuitive layout for non-planners, and using metrics that are meaningful for a layperson (e.g., peak hour volumes are meaningless to a layperson, while average seconds of delay at an intersection approach is something people can imagine).

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**Common Public Comments**

For highlights and themes of the feedback we heard from the community during these case studies, refer to the Community Engagement chapters of both the Palo Alto and Redwood City reports.
**Design Process**

The Redwood City and Palo Alto design processes incorporated many layers of inputs and progressed iteratively after each round of community input. This section describes each design input.

**Existing Plans**

**Build upon Previously Identified “Needs:”**

Recent planning efforts with relevant goals or visions for the corridor served as the initial foundation for the design concepts for this Project. While Redwood City’s Corridor Plan served as a starting point for major design decisions such as replacing on-street parking with protected bike lanes, Palo Alto did not have comparable recent efforts that were as focused. Still, many plans identified the need for improvements at a high level (referencing the need for safety improvements more generally) and the Bicycle and Pedestrian Master Plan identified two intersections on the corridor as part of recommended “School Commute Corridors.” These intersection-specific needs were used as part of the initial design exercise when pairing specific needs with potential improvements.

**Collision Profiles**

Reducing the number of bicycle and pedestrian collisions was a primary goal of the Creating Safe and Healthy Corridor Communities Project. The team performed a data-driven analysis of the corridor’s roadway collisions and the primary factors influencing them to identify the primary causes of traffic injuries and the specific locations in the study area with the greatest need for safety improvements.

- **Develop Collision Profiles:** The Statewide Integrated Traffic Records System (SWITRS) is typically the best data source since records include both collision information and key environmental factors surrounding each collision such as roadway network characteristics, demographics, and roadway conditions. The collision data and environmental factors can be used to create “collision profiles,” which describe the “who, where, when and how” of common collisions. Collision profiles consist of one or more collision, victim, or infrastructure-related variables that, when considered together, help explain the types of collisions occurring throughout the corridor.

- **Use Collision Profiles to Inform Design Solutions:** Ultimately, the goal of the collision profiles is to summarize the underlying factors that lend themselves to an actionable solution rather than invariable factors such as geographic location or time of day. This can be accomplished by matching the needs identified in each collision profile with efficient and cost-effective engineering countermeasures.
Performance Measures

Performance measures are most commonly used as an evaluation tool post-implementation, but they can also be used as a prioritization tool in the design phase of a project. Selected performance measures can be used to compare alternative design concepts.

Performance measures should be:

- **Community-Specific**: The Grand Boulevard Initiative presents a single vision for the El Camino Real Corridor, but practical change is implemented through a series of distinct projects that are largely completed at the community level. Those selecting performance measures should recognize that while high-level GBI goals are common among the peninsula communities, the relative importance of each of these goals may differ and the specifics of how to implement and measure progress toward each goal may differ further. GBI does not have its own performance measures, but the performance measures you select should link GBI Guiding Principles to goals set forth in existing local plans and the input of the project advisory committee.

- **Designed to Communicate Trade-offs**: Designing for high scores in all seven GBI goals—placemaking and streetscape, connectivity, cost, environment, multimodal mobility, community compatibility, and safety and public health—will likely not be possible for any one design alternative. As alternative designs are considered, the performance measures will play an important role in communicating to the public how each goal is being met (or not) and the interaction between goals. For example, a corridor design that results in a lower vehicle delay and thus a high vehicle level of service, may result in a lower level of bicycle comfort. Other designs might achieve a high level of connectivity by adding separated bike and pedestrian facilities, but in exchange for a high cost level. Illustrating this interaction between goals will be important to facilitate an informed discussion about project trade-offs during community engagement.

- **Project Stage- and Scale-Appropriate**: Performance measures are scale specific; metrics that work for a full corridor, such as “availability of pedestrian connection between activity centers,” may not apply...
or be measurable at the intersection level. In the initial stages of the project (i.e., cross-section visioning), only corridor-level measures should be used to compare the alternatives. Measures at this scale are most useful for honing in on a preferred vision in early stages of the planning process. Once a cross-section has been selected, it is more appropriate to use intersection-level or design treatment-specific metrics. Measures at this level, such as benefit level of collision countermeasures, can help communicate to the public the relative benefit of certain elements of the corridor during the design stages of the project. If the proposed project includes both a cross-section visioning stage and intersection design stage, planners could consider developing two separate sets of performance measures.

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<th>Performance Measures</th>
<th>Criteria</th>
<th>Results</th>
<th>Score</th>
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| Placemaking/Streetscape | - Wayfinding Opportunity  
- Pedestrian Space Opportunity | Criteria Met | 4 |
| Connectivity/Access | - Gap-Closing Elements  
- Improved Pedestrian Connection | Criteria Met | 5 |
| Cost | - Relative Cost Level | Low Cost | 3 |
| Environment | - Stormwater Treatment Opportunity | Low Engineering Effort | 3 |
| Multimodal Mobility/TOD | - Relative Impact on Roadway Capacity for El Camino  
- Relative Impact on Transit Reliability | Low Impact | 3 |
| Neighborhoods/Equity | - Community Support  
- Adjacent to “Community of Concern” | Criteria Met | 5 |
| Safety and Public Health | - Effect on Bike Level of Traffic Stress (LTS)  
- Relative Benefit of Collision Countermeasure | Low Benefit | 3 |

Performance Measure Criteria, Redwood City
Community Input

Community engagement activities should be structured so that feedback reverberates through the design process. Think about the input needed to advance the design, and craft an outreach question or activity to collect that input. The goal is to create a process yielding useful input that can easily inform design recommendations and build project support.

- **Open-Ended Questions:** Open-ended questions are important when the design team needs help from the community to populate the menu of choices. In the early stages of Palo Alto and Redwood City outreach, we asked community members to share their most important corridor destinations and draw their desired or favorite crossing locations on a map (see Outreach Board on the next page). Popular destinations and crossing preferences are not something we could have listed beforehand, but this information was critical in advancing the design process. During early visioning and concept phases, community input should be facilitated in an open-ended manner that doesn’t shoehorn responses into pre-identified buckets. Open-ended responses are more difficult to organize and feed back into the design process, but they are worth the time investment in exchange for the heightened level of authenticity and creativity they afford community members. Make sure to budget and plan staff hours to process open-ended community comments after a round of outreach.

- **Multiple-Choice Questions:** When the range of options has been narrowed down by previous rounds of input or by engineering constraints, it is more appropriate to ask a multiple choice or yes/no question based on pre-defined “buckets.” When this Project started, Redwood City had already prioritized bike lanes over on-street parking in conjunction with a parking management plan (El Camino Real Corridor Plan, 2017). Protected bicycle lane design is not uniform, however, and the design team asked the community to weigh in by voting for one of three separate cross-section designs where the width of the bicycle lane, the size of the bike lane barrier, and the size of the median varied. Other street design elements were kept stable to comply with Caltrans standards. Because there were only so many options available, it was most useful for the team to offer this question as a multiple-choice activity. Multiple choice questions are useful during the design stage to help inform design decisions based on community preferences, which proved to be a benefit during the Redwood City study. Examples beyond cross-section dimensions could include preferred transit amenities, programming for underutilized spaces, or level of improvements for a specific focus area such as a pedestrian underpass.

- **Always ask “Why?”** Regardless of whether you are asking an open-ended or multiple-choice question, you should always give community members the option to explain why they answered the way they did. When refining the design concepts, the explanation for why a community member likes or dislikes the current design is far more helpful than a simple yes or no vote.
WHERE DO YOU WANT TO CROSS EL CAMINO REAL?

The first step in identifying potential crosswalk locations is understanding how many people might use the crosswalk. You’re the local expert - tell us which potential crosswalk locations are likely to have the highest demand. Add stars to key destinations and mark your walking route!
Implementation

Quick-Build Options

The implementation of improvements along El Camino Real may look different for different cities. In some cases, portions of the project may be implemented over time, as funds and resources are available. Strategies for phased implementation may include coordinating with future resurfacing projects, development projects, or using cost-effective materials to get the project off the ground sooner. Defined as “quick-build” improvements, the latter are increasingly sophisticated and aesthetically-pleasing treatments that provide flexibility in implementation. Using quick-build treatments can also serve to install a pilot program, a strategy that allows the community to experience the functionality of the project and modify the design before upgrading to more fixed materials such as concrete curb. Four quick-build tools are provided below that can be used in the near-term to put improvements on the ground quickly and cost-effectively.

Painted Bulb Outs

In many locations, bulb outs are recommended to reduce crossing distances for pedestrians. Many cities have used painted bulb outs with raised elements such as delineator or landscape planters to define bulb outs without changing drainage patterns and without the added cost of concrete.

Tactical Bus Boarding Islands

Bus stops can also have similar temporary treatments. These can be thought of in the same vein as parklet spaces and can be used to enhance public space and engage local architects and artists. There are also prefabricated bus boarding islands on the market that cities can use to improve bus stops in the near-term. Oakland, Los Angeles, and New York City have experimented with prefabricated bus boarding islands.

Above Top: The City of Fremont has used a combination of painted bulb outs with self-watering landscape planters to achieve this effect. Above: Prefabricated boarding islands or parklet-style boarding islands can be used to extend the sidewalk and allow buses to stop in line to improve transit reliability. Photo credit: www.zicla.com
Many cities in the Bay Area, including San José, have had success with quick implementation of separated bikeways using painted buffer spaces and delineators or similar raised elements commonly made of plastic. The aesthetics of delineators have improved recently, and there are newer products on the market the City of San José could consider such as shorter, sturdier posts, and armadillos, which are recycled plastic dividers with a lower profile than posts.
Many cities have successful programs that improve safety by repurposing excess roadway space at skewed intersections with public spaces. These are often successful where foot traffic supports the creation of public space, such as in business districts. They can provide a distinctive look and feel congruent with the local neighborhood character, and are an opportunity to engage with local community-based organizations and artist groups. Maintenance of these spaces is an important consideration and could be an opportunity for a public-private partnership.

Above: An example of repurposing to remove a skewed intersection (and a redundant link in the roadway network) on Sunset Boulevard in Los Angeles. The resulting space now supports the Silver Lake Farmers Market and increases foot traffic in front of small businesses.
Design Library

The following sections provide several toolboxes of design options that were used during this Project and may be applicable elsewhere on the El Camino Real corridor.
Potential Safety Improvements

The following potential improvements were among those considered for application on a corridor-wide and location-specific level along El Camino. The visual glossary includes information on each treatment, including safety effectiveness. Choosing the appropriate treatments can depend on collision profiles, top concerns voiced by the community, or actions identified in previous studies.
## VISUAL GLOSSARY: POTENTIAL SAFETY IMPROVEMENTS

### CORRIDOR-LEVEL ENHANCEMENTS

- **Widened Sidewalk**
  - Sidewalks that are 12 feet wide include space for a landscaping buffer along the curb or improved transit stop amenities such as benches and shelters.
  - ![Visual Representation]

- **Protected Bike Lanes**
  - A physically separated path along a street dedicated to bicycles. The raised barrier between vehicles and bicyclists may include plastic posts, planters, a raised landscaped median, or community art.
  - ![Visual Representation]

### CROSSWALK ENHANCEMENTS

- **Curb Extensions**
  - Extends the sidewalk into the street to create a shorter pedestrian crossing distance, make pedestrians more visible to vehicles, and reduce the speed of turning vehicles.
  - ![Visual Representation]

- **Median Refuge Island**
  - Shortens crossing distances, and allows pedestrians to focus on one direction of vehicle traffic at a time while crossing.
  - ![Visual Representation]

### TRAFFIC SIGNAL IMPROVEMENTS

- **Pedestrian Countdown Signal**
  - Displays “countdown” of seconds remaining for the pedestrian crossing interval.
  - ![Visual Representation]

- **Longer Pedestrian Crossing Times**
  - Increases time for pedestrian walk phases, especially to accommodate vulnerable populations such as children and the elderly.
  - ![Visual Representation]

- **Longer Clearance Intervals**
  - Provides a short phase (1-2 seconds) where all intersection approaches are red, to allow all users to clear the intersection before the next green light.
  - ![Visual Representation]

- **Leading Pedestrian Interval**
  - Gives people walking a head start, allowing them to proceed during an all-red phase, in advance of turning vehicles.
  - ![Visual Representation]

### LOCATION-SPECIFIC ENHANCEMENTS

- **Left-Turn Access Removal**
  - Prohibits vehicles from turning left in order to reduce multi-modal conflicts.
  - ![Visual Representation]

- **Remove Slip Lane**
  - Modifies the corner of an intersection to remove the sweeping right turn lane for vehicles. Results in shorter crossings for pedestrians, reduced speed for turning vehicles, better sight lines, and space for landscaping and other amenities.
  - ![Visual Representation]

- **Right turn on red restriction**
  - Prohibits vehicles from turning right when signal is red. Appropriate for locations with a history of collisions involving right-hooks.
  - ![Visual Representation]

- **Red Curb to Improve Sight Distance**
  - Installs red curb at intersection approaches to remove parked vehicles and other sight obstructions, especially along multilane roadways.
  - ![Visual Representation]

- **Improved Wayfinding Signage**
  - A network of signs that highlight nearby amenities and services that are accessible from a given location by walking or bicycling.
  - ![Visual Representation]
Potential Streetscape Improvements

Some of the potential safety improvements also have opportunities to incorporate streetscape features, indicated with the leaf symbols in the safety improvement glossary. The following visual glossary organizes potential streetscape improvements into two categories: standard landscaping (white leaf symbol) and stormwater management strategies or "green infrastructure" (blue leaf). Matching icons from the safety improvement glossary are used to indicate the appropriate complementary safety treatment for each streetscape strategy.
Streetscape Improvements – General

The term Streetscape Improvements refers to the combination of natural and built elements placed within the public right-of-way that establish many aspects of the overall quality a street, including aesthetic, ecological, functional and economic benefits for all users of the street. Streetscape improvements include street trees and other landscape elements, paving materials, street furnishings, light fixtures, wayfinding signage, and other elements.

Green Infrastructure Option

According to the US EPA “Green Infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments.” Green infrastructure elements can be used as standalone streetscape features or be combined with general streetscape improvements as supported by local needs and conditions.

For explanation of transportation related symbols refer to Visual Glossary: Safety Improvements
Separated Bikeway Design

The following sections provide design guidance for separated bikeway elements. The design options cover the raised protective barrier, artistic elements, and intersection safety treatments and are tailored to the context of the El Camino corridor.

Forms of Separation and Emergency Access

Separated bikeway designs should be evaluated for raised curbs, landscaping, raised bike lanes, and/or other buffers in relationship to access for emergency vehicles. There are several material options available for the raised barrier along a separated bikeway. The Federal Highway Administration includes a range of options in their design guide including delineator posts, raised median, planters, and concrete parking stops. While many of these barrier types may fit within the available space on El Camino Real, the options below focus on designs that maintain access to the curb for fire department vehicles and personnel.

Elements that make access to adjacent properties or buildings difficult for emergency personnel, such as landscaping, were excluded from the list below.

Low-laying landscaping could be incorporated along a separated bikeway at strategic locations, such as where there are limited tall buildings that require special equipment and proximity for emergency vehicles.

Coordination with the local fire department and other emergency service providers is essential to ensure both public safety and good roadway design. A critical part of that coordination is understanding the infrastructural needs of various emergency service vehicles. Proposed street improvements should be evaluated in conformance with emergency service requirements and operational considerations. For example, the implementation of raised medians and/or the installation of prominent landscaping could interfere with fire suppression equipment accessing existing structures that front the public right of way.

For the purposes of complete streets planning and design, the Fire Marshal or other designated personnel should be consulted early in the project to inform project design and development and avoid major changes to the project at the end of the design process or after construction. In some cases, coordination with Fire Operations may be necessary to get a comprehensive understanding of whether a design will accommodate emergency services.

Hardscape Raised Median: A hardscape raised median can provide continuous raised protection requiring little long-term maintenance. This type of separation can be useful for fire vehicles to accommodate stabilizer arms for accessing tall buildings. Coordination with emergency services will be necessary to determine the height of the barrier curb to accommodate emergency vehicle staging and access. The design of a protected bike lane along 3rd Street in Austin, Texas includes a raised hardscape median (see photo example).

Mountable Curb: A sloped, mountable curb can serve as the buffer. A mountable curb provides access for emergency vehicles to pull up to and even onto the barrier if needed. This type of buffer is particularly useful along narrow sections, where there is less than 26’ of width for emergency services. One variation of the mountable curb can be seen on Sands Street in New York City where the curb ramps up to a raised bicycle lane a few inches above the height of the roadway (see photo example). It should be noted that standard vertical curbs (with a hard edge rather than rolled) can be more effective to deter illegal parking (i.e. parking in the bikeway). SFMTA experimented with four different curb types on Market Street and found that each type had pros and cons. The results of the pilot project are included in a blog post by the agency.
**Soft-hit Posts:** These combine a wide, painted buffer with vertical posts in the middle. Best practices are to limit space between posts, use upside-down “T” shaped posts, and budget for replacement posts since they can be damaged if run-over enough times.

Example: SFMTA experimented with four types of posts and eventually settled on the third one back in this photo, a white/silver Pexco FG 300 Post with TG Curb, based on the following criteria: least expensive, easiest to install, and interchangeable parts available.

**Wave Delineator:** This is an artistic alternative to the soft-hit posts. Like soft-hit posts, the wave can be crossed by fire trucks and other emergency vehicles. This set-up is ideal for temporary pop-up bike lanes when communities want to create a demonstration protected lane or direct bike traffic during day or week-long events. Other communities, such as New Orleans, LA (pictured above), however, have used the wave for longer periods of time.
Artistic and Interactive Elements

Creative design elements create a fun and vibrant environment for those using separated bikeways and may encourage use of the facilities.

**Bike Lane Art:** Customize the bike lane markings with colors, icons, or images representing the local community.

Examples: San Jose’s shark icons (see image above), [Portland’s Bike to Books contest](#)

**Glow-in-the-Dark Paint:** Use glow-in-the-dark paint to stripe all or part of the bike lane. This example may require additional research to confirm compliance with national standards such as the *Manual of Uniform Traffic Control Devices* (MUTCD).

Examples: [Texas A&M intersection treatment](#) (see image above)
**Landscaping:** Fill the barrier with flowers, short shrubs, or grasses. This design will require special drainage systems and may require adjustments to roadway cross-slopes to ensure appropriate storm water flow.

Examples: San Francisco Embarcadero rendering (see image above), Ballston, Virginia landscaped buffer

**Permeable Hardscape:** A mid-point between hardscape and vegetation. This design requires special drainage systems and may require adjustments to the roadway slopes to ensure appropriate storm water flow.

Examples: Barcelona center-running bike lane (see image above)
Decorative Pavers or Tiles: Use decorative pavers or tiles to create a hardscape median.

Examples: Memphis’s Hampline rendering (see image above)

Eco-counters: Use a real-time display to count the number of lane users each day, week, and/or year.

Examples: [Seattle, San Francisco, UCLA](see image above)
Addressing Right-Turn Conflicts at Intersections

Intersection treatments summarized in the following sections were chosen on a technical basis, following best practices for intersection design along protected bikeways and feedback from stakeholders, while considering the constraints and context of El Camino. The focus for these treatments is minimizing the potential for “right hook” conflicts between vehicles and bicycles at intersections. Main considerations include existing traffic control, available right-of-way, and the volume of conflicting right turns during the peak periods.
**What is it?**
Cars and bikes share the same road space in shared right turn zones, which help position vehicles closer to the curb to facilitate the right turn and reduce "right hook" collisions with bicyclists. A dashed green bike lane is used to indicate that cars and bikes may "mix" in this area.

**Location Considerations**

- **TRAFFIC CONTROL**
  - SIGNAL
  - STOP SIGN
- **VOLUME OF RIGHT TURNS**
  - LOW
  - MED
  - HIGH

**Design Considerations**

- Only recommended for physically constrained locations

**Pros**

- Does not require dedicated right-of-way for bicyclists at intersections in constrained locations
- Allows vehicles to merge with bikes against the curb prior to turning, reducing the likelihood of the "right hook"

**Cons**

- Requires vehicles to look over their shoulder to avoid conflicts with bicyclists
- Does not provide physical separation for vehicles and bicyclists

**Where Does this Work on El Camino Real?**

<table>
<thead>
<tr>
<th>REDWOOD CITY</th>
<th>PALO ALTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPLE ST</td>
<td>PEPPER AVE</td>
</tr>
<tr>
<td>BEECH ST</td>
<td>PORTAGE AVE</td>
</tr>
<tr>
<td>LAUREL ST</td>
<td>HANSEN WAY</td>
</tr>
<tr>
<td>HAZEL AVE</td>
<td>OREGON EXPWY</td>
</tr>
<tr>
<td>CHARTER ST</td>
<td>SHERIDAN AVE</td>
</tr>
<tr>
<td>VERDAN AVE</td>
<td>SHERIDAN AVE</td>
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<tr>
<td>WILLOW ST</td>
<td>OREGON EXPWY</td>
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<tr>
<td>HEMLOCK AVE</td>
<td>OREGON EXPWY</td>
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<tr>
<td>MANZANITA ST</td>
<td>OREGON EXPWY</td>
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<tr>
<td>LAMBERT AVE</td>
<td>OREGON EXPWY</td>
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<tr>
<td>CAMBRIDGE AVE</td>
<td>OREGON EXPWY</td>
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<tr>
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<td>OREGON EXPWY</td>
</tr>
<tr>
<td>STANFORD AVE</td>
<td>OREGON EXPWY</td>
</tr>
</tbody>
</table>

**OPTION 1**

Shared Right Turn Zone
**Protected Corner/Intersection**

**What is it?**
Protected intersections clearly define pedestrian and bicyclist operating spaces and minimize potential conflicts between users. For example, the corner refuge island protects bicyclists from right-turning vehicles by physically separating the bike lane up to the point where the bicyclist crosses the side street, while reducing vehicle turning speeds and guiding vehicles to meet the bicycle crossing at a near-90 degree angle to improve sight lines of oncoming bicycles.

**Location Considerations**

<table>
<thead>
<tr>
<th>TRAFFIC CONTROL</th>
<th>VOLUME OF RIGHT TURNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL</td>
<td>STOP SIGN</td>
</tr>
<tr>
<td>LOW</td>
<td>MED</td>
</tr>
<tr>
<td>MED</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

- **LOW**: <=50
- **MEDIUM**: 50-150
- **HIGH**: > 150

**Design Considerations**

- Requires space for set-back placement of bike crossing (i.e. locations with additional space due to on-street parking removal or slip-lane closures)
- Recommended where it’s important to facilitate left turns for cyclists

**Pros**

- Extends the physical barrier of the protected bike lane into the intersection, creating a refuge and a clear path of travel for bicyclists
- Provides a forward stop bar for cyclists to provide a “head start” and improve visibility of bicyclists
- Setback crossing prevents vehicles from turning right into their blind spot, thus improving visibility of bicyclists and pedestrians
- Reduces vehicle exposure for pedestrians/bicyclists
- Helps facilitate left turns for bicyclists

**Cons**

- Requires adequate space for dedicated right-of-way for people who walk and bike and for corner refuge islands

**Where Does this Work on El Camino Real?**

- **REDWOOD CITY**:
  - Main St
  - Pine St
  - Manzana St

- **PALO ALTO**:
  - Oxfords AVE
  - Sherman AVE
  - Grant AVE
  - Sheridan AVE
  - Oregon Expwy
  - Pepper Ave
  - Acacia Ave
  - Hazel Ave
  - Laurel St
  - Oak Ave
  - Lathrop St
  - Roosevelt Ave
  - Lincoln Ave

- **LOW**: <=50
- **MEDIUM**: 50-150
- **HIGH**: > 150
What is it?
Protected bicycle phases are desirable in locations where high volumes of right turning vehicles conflict with a parallel separated bike lane. Provision of a protected bicycle phase requires a dedicated right turn lane and should be tested for potential impacts to intersection delay and queueing.

Location Considerations
- TRAFFIC CONTROL
- VOLUME OF RIGHT TURNS

Design Considerations
- Dedicated right turn pocket required
- Consider electronic LED blank-out signs to emphasize no right turn on red during bicycle phase
- Separates signal phase for right-turning vehicles and bicyclists, removing the “right hook” conflict

Pros
- Separates signal phase for right-turning vehicles and bicyclists, removing the “right hook” conflict

Cons
- Requires dedicated right turn pocket, pocket length
- Can result in longer cycle lengths at signals, and thus increased delay, at intersections where right-turn vehicle volumes are high

Where Does this Work on El Camino Real?

REDWOOD CITY
- ROOSEVELT AVE
- OAK AVE
- MAIN ST
- MANZANITA ST
- LAUREL ST
- HAZEL AVE
- WILLOW ST
- HEMLOCK AVE
- CHARTER ST
- OXFORD AVE
- COLLEGE AVE
- CAMBRIDGE AVE
- CALIFORNIA AVE
- SHERMAN AVE
- GRANT AVE
- SHERIDAN AVE
- PEPPER AVE
- OLIVE AVE
- ACACIA AVE
- PORTAGE AVE
- HANSEN WAY
- LAMBERT AVE

PALO ALTO
- REDWOOD AVE
- OREGON EXPWY
- STANFORD AVE

OPTION 3
Separate Bicycle Phase
Raised crossings are an effective strategy for reducing crashes between motorists and bicyclists because they slow vehicle speeds, increase visibility of people walking and biking, and increase motorist yielding behavior. Raised crossings are usually appropriate only on minor road crossings and driveways and could be considered for separated bike lane crossings where motorists are required to yield to bicyclists while turning or crossing.

Location Considerations

<table>
<thead>
<tr>
<th>TRAFFIC CONTROL</th>
<th>VOLUME OF RIGHT TURNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only appropriate at driveways or minor stop-controlled side streets that are intended to be calmer (&lt;30mph) with lower volumes (no through traffic)</td>
<td></td>
</tr>
<tr>
<td>Most appropriate for side streets with right in/right out movements only; for locations with left turn access, crossing should be set back 18’ minimum to allow space for vehicle to wait before/after making a left turn</td>
<td></td>
</tr>
<tr>
<td>Not appropriate on truck routes</td>
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</tbody>
</table>

Pros

- Slows vehicle traffic when entering and exiting side streets and driveways
- Creates a “gateway” feel for entering neighborhood roadways or parking lots

Cons

- Requires space for approach ramp (i.e. locations with additional space due to on-street parking removal or slip-lane closures)
- If placed along a bike lane that is not already raised, can create discomfort for bicyclists ramping up and ramping down in succession

Where Does this Work on El Camino Real?

- REDWOOD CITY
- PALO ALTO

Recommended volume thresholds:

- LOW: <=50
- MEDIUM: 50-150
- HIGH: > 150
Bicycle Signals

The use of bicycle signal faces was approved by the Federal Highway Administration (FHWA) on an interim basis in 2013. The interim approval status is a means to approve use of the device prior to being officially adopted into the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). The resulting standards and guidance that apply to this interim approval are laid out in a memo issued by the agency, called Interim Approval for Optional Use of a Bicycle Signal Face, or IA-163, as well as the subsequent clarifying memo released in 20144. The Interim Approval and clarification memo do not require the use of bicycle signal faces, but if used, compliance with these documents is required unless a request for experimentation is approved and granted to use them otherwise. The California MUTCD also includes additional information and guidance for bicycle signal faces in Section 4D, specifically signal timing and bicycle detection, which are not included in the standards or guidance provided in the IA-165.

Bicycle signal faces can be used to continue the bicycle lane on the right-hand side of an exclusive turn lane, such as those recommended at the Main Street intersection in Redwood City, or to provide an increased level of protection by facilitating unusual or unexpected arrangements of the bicycle movement through complex intersections or conflict areas. Highlights of the requirements outlined in IA-16 are included below.

- **Vehicle Turn Restrictions**: Conflicting motor vehicle movements (including right turns on red) must be restricted during the green or yellow bicycle signal indication. Vehicles that are traveling in a parallel through direction can have a simultaneous green, however movements that allow a right or left turn across the bicycle facility must be prohibited during the bicycle phase.

Permissive motor vehicle movements across bicycle signal face-controlled movements are not compliant with IA-16.

Restricting vehicular turning movements during bicycle phases can be achieved by adjusting the signal phasing. For example, a right turn lane (or pocket) could be signalized separately from the through movement in order to facilitate through and bicycle movements separately from the turning movement. In this case, the turning vehicles would be restricted by a signal head displaying a red arrow at the time of the bicycle movement (see image below).

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3 https://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/ia16.pdf
4 https://mutcd.fhwa.dot.gov/resources/interpretations/pdf/q_09_47.pdf
To emphasize these turn restrictions, an electronic "No Right Turn" sign can be used, which displays the turn restriction only during the green, yellow, and red clearance interval of the bicycle signal phase.

Note that use of these electronic signs is best limited to emphasize a “no right turn on red” scenario, i.e. during a red signal indication for vehicles on the relevant approach.

- **Operation:** Part 4 of the MUTCD, which provides standards and guidance for highway traffic signals, also applies to the operation of bicycle signals. Signal timing for bicycle signals on El Camino, such as minimum phase lengths, should follow Section 4D.105(CA) and Table 4D-109(CA) of the California MUTCD.
  - **Prohibiting Bicyclist Turns:** Arrows must be used as part of the bicycle signal to accomplish "turn prohibitions" for bicycles (see image below).

- **Signal Warrants:** Based on the most recent revision to the CA MUTCD (Revision 3), there are no explicit bicycle signal warrants. Use should be based on engineering judgment. For more guidance for applicable locations for bicycle signals on El Camino Real, refer to the preceding section of this report, Addressing Right-Turn Conflicts at Intersections.
- **Regulatory Signs:** The Bicycle Signal sign, R10-10b, (shown below) must be installed adjacent to bicycle signal faces. The signal bracket may be customized to mount the sign above the bicycle signal or to the side of it, depending on the specific conditions present.

![Example R10-10b sign, Source: nacto.org](image)

- **Prohibited Uses:** IA-16 prohibits the use of bicycle signals used with pedestrian hybrid beacons. It also does not allow for controlling bikes that are sharing a lane with vehicles or to provide a phase that stops all vehicles and pedestrians in order to allow for bike movements from multiple conflicting directions (also known as a Bicycle “Scramble”).
Transit Reliability

El Camino is a critical transit corridor, and for many jurisdictions along the San Francisco Peninsula, it provides some of the most frequent bus service in the city. Cities have a range of options to choose from to improve transit reliability on El Camino Real. The following toolbox provides potential options and some of the tradeoffs for each.
TRANSIT RELIABILITY TOOLBOX

TRANSIT SIGNAL PRIORITY (TSP)
Description:
Sensors are used to detect the presence of a bus in order to extend the green light or prompt an early red light for cross street traffic so that buses stop at fewer red lights. Many signals on El Camino Real already use transit signal priority.
Tradeoffs:
- Bus travel time savings between 1 and 2.5 minutes along a mile-long area
- Neutral effect on vehicle delay on El Camino
- Vehicle delay on cross streets can increase by up to 8 seconds
Source: AC Transit Boarding Island

BUS BULB/CURB EXTENSION
Description:
Bus bulbs extend the sidewalk into the street or parking lane so that buses can stop in the lane. Stopping in the lane prevents the need to merge in and out of traffic at each stop, which saves the bus time and minimizes conflict with vehicles and bicycles.
Tradeoffs:
- Travel time savings between 5 – 10 seconds at each intersection
- Reduced pedestrian crossing distance across El Camino Real
- More space for transit amenities
- Cars using the curbside lane would need to change lanes to avoid delay
- May require parking removal near intersection

QUEUE JUMP
Description:
A queue jump is a short bus-only lane or shared bus-auto right turn lane at an intersection. Used in combination with transit signal priority, it allows the bus to enter the intersection in advance of queueing vehicles.
Tradeoffs:
- Bus travel time savings between 1 and 3 minutes along a mile-long corridor
- Effect on auto delay depends on implementation
- May not allow for protected bike lanes on El Camino

BOARDING ISLAND
Description:
Boarding islands create a platform for passengers to load and unload adjacent to the travel lane so that buses can stop in the lane. Stopping in the lane prevents the need to merge in and out of traffic at each stop, which saves the bus time and minimizes conflict with vehicles and bicycles. Boarding islands are positioned so that right turning vehicles or bicycles travel to the right of the island.
Tradeoffs:
- Less conflict between buses and right-turning vehicles
- Safety benefits for bicycles
- All other tradeoffs are the same as those for the Bus Bulb

TRANSIT RELIABILITY TOOLBOX

End Green Light
3-10 sec.

Source: NACTO
Bus Stop Design Alternatives
BUS STOP DESIGN OPTIONS

Buses along El Camino Real currently travel in the same lane as cars and pull out into the parking lane at bus stops to pick up passengers at the curb. As communities move toward a corridor that is multimodal, the design of bus stops will need to be carefully considered. Based on the available width to the back of the sidewalk, cities could install bus stop improvements according to the three options shown below. These design options prioritize transit shelters, improved transit travel time, and eliminating mixing of buses and bikes where bike lanes are present. All three allow the bus to stop in the travel lane to accommodate space for a transit shelter and a raised bike lane or widened sidewalk.

SHARED BUS BOARDING PLATFORM
(IN-LANE STOP; BOARDING PLATFORM SHARED WITH BICYCLES)

TRADEOFFS

- **Transit Travel Time**
  - Bus travel time reduced by 5-10 seconds at each stop by stopping in the lane
- **Bicycle Comfort**
  - Low level of stress for bicycles due to separated bus activity and direct path of travel
- **Bicycle Safety**
  - Removes bus-bike conflict at curb
- **Transit Amenities**
  - Room for bus shelter
- **Sidewalk Width**
  - 1' expansion in sidewalk width (assumes an 8' existing sidewalk width)

- **Construction Complexity**
  - Medium level of construction complexity
- **Vehicle Delay**
  - About 20 seconds of delay every 7 min during peak bus service if vehicles are unable to change lanes (assumes a 7-minute headway during peak bus service)
- **Bus Rider Comfort**
  - Bus boarding area shared with bicycles

SEPARATE BUS BOARDING PLATFORM
(IN-LANE STOP, SEPARATE FROM BIKE LANE)

TRADEOFFS

- **Transit Travel Time**
  - Bus travel time reduced by 5-10 seconds at each stop by stopping in the lane
- **Bicycle Comfort**
  - Low level of stress for bicycles due to separated bus activity
- **Bicycle Safety**
  - Removes bus-bike conflict at curb
- **Transit Amenities**
  - Room for bus shelter
- **Bus Rider Comfort**
  - Dedicated bus boarding and waiting area, separate from bicycles

- **Construction Complexity**
  - Medium level of construction complexity
- **Vehicle Delay**
  - About 20 seconds of delay every 7 min during peak bus service if vehicles are unable to change lanes (assumes a 7-minute headway during peak bus service)
- **Sidewalk Width**
  - Pinch point in sidewalk of 4' reduction in width (assumes an 8' existing sidewalk width)

BUS BULB OUT
(IN-LANE STOP, NO BIKE LANE)

TRADEOFFS

- **Transit Travel Time**
  - Bus travel time reduced by 5-10 seconds at each stop by stopping in the lane
- **Sidewalk Width**
  - Maintains existing sidewalk width
- **Transit Amenities**
  - Room for bus shelter
- **Bus Rider Comfort**
  - Dedicated bus boarding and waiting area, separate from other travel modes

- **Construction Complexity**
  - Medium level of construction complexity
- **Vehicle Delay**
  - About 20 seconds of delay every 7 min during peak bus service if vehicles are unable to change lanes (assumes a 7-minute headway during peak bus service)
- **Bicycle Comfort**
  - High level of traffic stress for bicycles due to mixing with vehicles and buses
- **Bicycle Safety**
  - Does not eliminate bus-bike conflict at the curb; introduces vehicle-bike conflict for bikes travelling in the parking lane by forcing them into the travel lane at bus stops

*Although bike lanes are not included in this option, bicyclists are considered legal users of El Camino Real and may still use the corridor
Separate Bus Boarding Platform - Rendering

Grand Boulevard Initiative
people friendly places